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# REPORT

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## STRAWBERRY HILL MINE,

BY

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WINDSOR, N. S.

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## CONTENTS.

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- I.—Introduction.
- II.—Situation of the Property.
- III.—The Lodes.
- IV.—The Forest Lode.
- V.—The Faults.
- VI.—Proposed work on the Forest Lodes.
- VII.—The Hill Lode.
- VIII.—The Tunnel Lode.
- IX.—The Wallace Lode.
- X.—The Dunbrack Lode.
- XI.—The Mill.
- XII.—The Dioritic Dyke.
- XIII.—The Gold Streak.
- XIV.—Conclusion.

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## APPENDIX.

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- I.—Suggested Plan of immediate Operations.
- II.—Subsequent Operations.

# R E P O R T.

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## I.—INTRODUCTION.

THE Strawberry Hill Gold Mine, in the district of Tangier, is distinguished by some geological features which have not yet been recognized in other districts in Nova Scotia.

It is divided into two unequal parts by an extensive belt of Dioritic Trap, about forty feet in width.

At its western boundary there is a belt of Brecciated Conglomerate, in some places thirty feet broad, which marks the line of a great dislocation; the throw on the Strawberry Hill side being to the north.

Between the belt of Trap and the Brecciated Conglomerate, a distance of two thousand feet, a series of small faults, eighteen being already known and their positions fixed, have thrown the lodes, by successive steps, through an aggregate distance of 158 feet to the north.

East of the trap belt the lodes are not affected by faults as far as the boundary of the property, a distance of six hundred feet.

The known and worked lodes occur in an Auriferous Zone, 200 feet broad, throughout the entire length of the property (2,600 feet.) Beyond and north of these limits lodes have recently been discovered, but nothing is known of their gold producing character.

In the Auriferous Zone, the Forest lode has been worked for a horizontal distance of about 1,500 feet, and to a vertical depth not exceeding 140 feet. The mean depth of the entire work on the Forest lode does not exceed 33 feet.

The quartz crushed in the mill since February, 1869, and taken almost exclusively from the Forest lode, has amounted to 1,350 tons, yielding 1,515 oz., being an average of 1 oz. 2 dwt. 10 gr. per ton. Other lodes have been worked and prospected to a small extent, as will be described in the sequel.

Little or nothing is known of the areas to the north or south of the Auriferous Zone.

From these introductory observations it will be seen that the Strawberry Hill property, is, in fact, a new mine, and as yet but imperfectly opened and explored.

## II.—SITUATION OF THE PROPERTY.

Strawberry Hill Mine is situated at the head of Pope's Harbour, on the Atlantic coast, about 60 miles to the east of Halifax. It is accessible by post-road or by coasting vessels; Pope's Harbour being sufficiently deep and commodious to admit vessels of the largest class.

The property comprises 55 whole areas of 150 by 250 feet, and three parts of areas 70 by 250. The breadth of the property on the course of the lodes, which are not parallel to the area lines, is 2,500 feet. The land rises from a height of twenty-three feet above tide to an elevation of 120 feet, but the mean level of the Auriferous Zone is about 65 feet above the sea level; this affords ample fall for surface drainage.

## III.—THE LODES.

The following table shows the number and character of the known lodes; these are distributed in a belt occupying about one-third of the entire area of the property. The remaining portion is, to a large extent, unprospected.

*Table of known Lodes on the Strawberry Hill Property.*

NAME.	DISTANCE.	THICKNESS.	YIELD PER TON.
No. 1.—Wallace.....	0 ft.	3 small Lodes worked together.	5 to 7 dwts.
No. 2.—A few small Lodes, not examined .....	.....	.....	.....
No. 3.—Forest.....	47 ft.	5 in to 1½ in.	4 to 1 oz.
No. 4.—Chambers .....	22 ft.	.....	.....
No. 5.—Hill Lode.....	50 ft.	2 ft.	.....
No. 6.—Numerous small Lodes, not examined.....	.....	.....	.....
No. 7.—Tunnel Lode .....	50 ft.	.....	8 dwts.
No. 8.—Dunbrick .....	15 ft.	3 in.	14 dwts.
No. 9.—Lode .....	12 ft.	.....	.....
No. 10.—Iron Lodes .....	120 ft.	.....	.....

## IV.—THE FOREST LODE.

This is the lode which has given to the Strawberry Hill property its reputation. It varies in thickness from 5 inches to 1½ inches. The deepest shaft sunk on this lode is in all 144 feet; being 122 in the rock and 22 feet in the drift. It has been opened

to a greater or less extent from one end of the property to the other, by means of 22 shafts.

With it is associated another lode, called the South Forest, and separated from the Forest lode by three feet of felspathic sandstone, locally called whin. The thickness of the South Forest varies from one to three inches, as far as it has been examined.

The foot-wall of the Forest is composed of 8" (inches) of slate, succeeded by 4 to 6 inches of whin, which is again underlaid by 6 inches of slate. With rare exceptions, the quartz only of the Forest lode has been crushed. The extent to which the quartz of both lodes has been taken out, is represented by a horizontal distance of 500 feet, and a depth of 15 feet. So that it may be said that one-sixth portion only of the South Forest has been extracted, compared with the quantity of quartz taken from the North Forest; in other words, five-sixths of the South Forest lodes still remain standing in the shafts and stopes.

The relation between the north and South Forest lodes is intimate and peculiar. Numerous small cross lodes (spurs) starting from the North Forest penetrate the whin towards the South Forest. It is not known by actual observation whether these connect with the South Forest, but it is very probable that some of them do so. It is further remarked that as the North Forest diminishes with the depth, the small cross lodes increase in number. It is also alleged that the south lode either maintains its thickness or increases with the depth.

The section of the Forest lode shows this structure, which is by no means uncommon (Sheet No. I.) In Australia the spurs from lodes are represented to be sometimes very rich in gold, and where they occur in greater numbers than usual, the lode is comparatively poor. (See Brough Smyth's description of the Catherine Lode or Reef, p. 323).

It is a matter of the highest importance to this mine, that the South Forest and the intervening sandstone with interlacing spurs should be thoroughly tested, especially where the North Forest begins to thin out and throw off the spurs. In fact the extraordinary richness of the North Forest lode has led to the neglect of the South Forest, and to the adoption of a system of mining which almost always proves to be of a very treacherous and unstable character.

The cost of mining this lode has varied from 40 cents to 75 cents per foot, enough only of the wall rock being taken out to admit of the works being carried on. The quartz obtained for the

crusher has varied from  $2\frac{1}{2}$  tons to  $1\frac{1}{2}$  tons per hundred square feet. Taking the lowest cost and the largest yield, the cost per ton would be \$16. Taking the highest cost and the smallest yield, the average would be \$50 per ton. The mean of these is \$33 per ton. This mean does not represent the actual mean cost of winning the gold, for the proportions between the quantities raised at the different prices are not given. The items are introduced for the sake of comparisons to be drawn from the results of a different system of mining.

The average breadth of the belt from the South Forest to the band of slate forming the foot wall of the North Forest is four feet six inches. The whole of this should be taken out, conveyed by trolleys to the mill and crushed. The cost of mining will not exceed\* \$3.50 per ton; cost of crushing (see mill) one dollar a ton. A yield of  $4\frac{1}{2}$  dwts. will pay all expenses, and the probability is that the yield will far exceed that estimate. Even if the cost reaches  $5\frac{1}{2}$  dwts per ton, there can be little doubt that the profits under this system will be very considerable. According to experience, it must be inferred that the spurs proceeding from the North Forest towards the South Forest are auriferous, and also that the South Forest itself maintains its original character. It will not be essential to cross the whole of the so-called whin; where the spurs are few, much of the whin may be rejected, but this will depend upon the results of experience.

It will be fair to assume the general composition of the Forest lodes to be as follows:

Quartz, including North and South Forest and spurs,	6 to 7 in.
Sandstone .....	2' 0"
Slate .....	8"
Total crushing material .....	<u>3' 2"</u>
Sandstone rejected.....	1' 0"
Total mineral handled.....	4' 2"

When the remarkable richness of the North Forest lode is regarded in connection with its relation to the South Forest and the connecting spurs, it is a very reasonable supposition to place the yield at  $7\frac{1}{2}$  dwts. a ton. With the cost of mining and manipulation, including interest on capital at  $5\frac{1}{2}$  dwts. per ton, the profits would be 20 dwts. a day, equal to about \$20 for the present mill, with its complement of 10 stamps. Under all circumstances, it is very advisable to take out the North and South Forest together, and to

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\*Mr. Forest says he could take the belt out for \$1.50, instead of \$3.50.

crush with them a portion of the slate and part of the sandstone adjacent to the North Forest, and the whole of it, when the spurs are numerous, for it is more than probable that these *spurs have been agents* in carrying off or transferring gold towards the South Forest, in which direction they all point.

#### V.—THE FAULTS.

An inspection of the plan shows that the lodes in the auriferous zone have all been faulted to the north. The gold streak on the Forest lode dips westwardly towards the breaks; the breaks themselves incline to the east. Stoping eastward on coming to a break, the lode has to be sought for south of the break, and when the gold streak or zone of highly auriferous quartz is cut off by the break, its position on the other side of the break will be altogether dependant upon the uplift or down-throw. Looking at the plan, it will be seen that when the breaks occurred near the present tunnels at the western extremity of the property, an uplift accompanied by a thrust to the north\* occurring with each successive break, would throw the outcrops of the lodes as represented on the plan. There is evidently an important fault in the space left blank or uncolored on the plan. East of this space, a series of down-throw faults without any northerly thrust would explain the position of the outcrop of the lodes. The ascertained position of the gold streak, which dips at a high angle to the west, is consistent with the supposition of a series of uplift and down-throw faults proceeding from west to east; but here, as at Montague, there may be several gold streaks or zones of highly auriferous quartz. In the absence of records of work, it is impossible to form any decided opinion on this very important point. The plan, regarded as a section, will show the approximate limits of the uplifts and downfalls in the strata. The dotted line between the eastern and western portions of the lodes shows the approximate relative horizon extent of the throws, and the depth of the shafts, which are measured by the richness of the lode, afford the strongest proof of the existence of several gold streaks running parallel to one another. This being the case, an adit level driven on the course of the lode and breaks cannot fail to cut or intersect some of the gold streaks at the depth of the deepest shaft—namely, 144 feet. This is illustrated in the diagram marked No. 5. The

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\*About 200 feet east of Barton's mill, the strike of the rock is N. 50 E. The same strike occurs 1,200 feet due South of Barton's mill.

diagram is to a certain extent conjectural, in consequence of the absence of working plans and records; it is introduced merely for the purpose of more clearly illustrating the probable importance of the proposed work.

#### VI.—PROPOSED WORK ON THE FOREST LODES.

It is suggested that the deepest shaft on the Forest lode be made a main working shaft, of the full width of the mineral between, and including the north and south Forest lodes, together with the belt of slate eight inches thick on the foot wall of the north Forest. This will form a main shaft 4 feet 3 inches wide, 10 feet broad and 144 feet deep. Levels can then be carried to the east and west and along the breaks, the position and extent of which are known. The shafts already sunk to the east and west of the main shaft are 120, and 99 feet deep respectively. One of these can be continued down to serve as an air shaft.

Subsequently a tunnel can be driven north and south from the bottom of the main shaft to intersect the Chambers, Hill, Tunnel and Dunbrack lodes on the north, and the Wallace lode on the south, together with the numerous intervening lodes which are known to exist, but which have not yet been prospected. All the work on the Forest lode will afford mineral for crushing, the only dead work will be the driving of the north and south tunnel, which would not be commenced until the stopes on the Forest lodes are well under way. The deep shaft on the Forest lode is represented to be in good order and provided with a horse whim. It would require to be enlarged to the dimensions stated, in order to convert it into a main shaft suitable for hoisting and pumping gear and ladders with platforms at proper distances. The enlargement of the shaft would supply mineral for crushing. The hoisting and pumping will eventually have to be accomplished by steam power. Similarly, No. 3, on the east side of the dyke, should be made a main shaft. It has been already stated that five-sixths of the south Forest lode with the underlying sandstone interlaced with spurs from the North Forest still remain standing in the shafts and stopes. It would be advisable, in order to keep the mill running day and night, to take out the mineral from those shafts and stopes where the spurs from the North Forest show themselves in force. If this were accomplished without deepening the shafts it would not increase the injurious effects already produced by the numerous existing openings in the rock, and it would render a considerable portion of the dead work already done in some measure remunera-

tive, besides aiding in accumulating a store of mineral to keep the mill constantly going, which is one important feature of economical management.

### VII.—THE HILL LODE.

This important lode has been opened at two places, about 1,400 feet apart. It was examined at the eastern opening, and a section on sheet, No. 2, exhibits its structure.

It is a remarkable aggregate of alternations of quartz and slate, as follows, commencing from the south wall :

No. 1—2 feet	.....	Quartz.
2 4 "	.....	Slate interseamed with quartz lodes.
3 0 "	3 inches.....	Quartz.
4 0 "	½ "	Slate.
5 0 "	4 "	Quartz.
6 2 "	0 "	Slate.
7 0 "	3 "	Quartz.
8 3 "	6 "	Slate interseamed with quartz.
9 5 "	0 "	Slate.
10 1 "	6 "	Quartz.

Total....19 ft. 1½ in.

A portion of this aggregate has been crushed in the mill, and yielding at the rate of  $2\frac{1}{2}$  dwts. to the ton. It will be shown in the sequel that a loss of gold, to the extent of one-third, occurred during the crushing; the average may be put at  $3\frac{1}{2}$  dwts. per ton. But this represents the yield at the surface only. Below the influence of the atmosphere it will probably be found to exceed  $3\frac{1}{2}$  dwts. per ton.

Mr. Forest states that this mass of Auriferous lodes and slate can be mined for one dollar a ton. When the mill is working day and night the cost of crushing is one dollar a ton.\* Add to these

\*The mill with 10 stamps can crush 10 tons per diem, working day and night.

Wages, 2 men at \$1.25 each.....	\$2.50
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" Night shift.....	2.50
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Wear and tear of mill.....	2.50
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Wood, 2 cords at \$1.25 per cord, supplied from the property—(500 acres of excellent wood land.).....	2.50
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Total cost.....	\$10.00
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Or one dollar per ton.

Cost of mining.....	\$1.00 per ton.
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Total cost.....	2.00 "
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Ascertained yield  $2\frac{1}{2}$  dwts., not including loss in the tailings.

expenses an additional 50 cents, the total cost of winning the gold will be \$2.50 per ton. Yield \$3.50, as shown under the head of 'Mill Work.' Profit one dollar per ton.

The mode of working this lode would be by means of a vertical main shaft with lateral drifts and stopes on the course of the lode. The present opening is about 90 feet above the mill dam, and facilities exist for draining the surface water to the depth of 30 or 35 feet.

### VIII.—THE TUNNEL LODE.

The Tunnel lode is in some respects similar to the Hill lode. It consists of the following aggregate at its eastern section :

1. Sandstone.
2. Quartz, 1 to  $1\frac{1}{2}$  inches.
3. Slate with seams of quartz, 2 feet.
4. Three small lodes, two of 1 inch, and one of  $1\frac{1}{2}$  inch, separated by a thin seam of slate 1" to  $\frac{1}{2}$ " in thickness.
5. Felspathic sandstone, 14 inches.
6. Slate,  $3\frac{1}{2}$  inches.
7. Quartz lode,  $1\frac{1}{2}$  inches.

Total, 4 feet, of which there is 2 feet 10 inches crushing material. (Figure I., Sheet No. 2.)

At the western section in the Tunnel lode, a true vein, locally called a "Bull Vein," cuts it, as represented in Figure II. on Sheet No. 3.

This so-called Bull vein is important, and, although a prejudice exists against "Bull veins" in Nova Scotia, it appears to be without any foundation. Recently a "Bull vein" taken out on the adjoining property to the Strawberry Hill, showed large sights of coarse gold.

The true vein intersecting the Tunnel lode, varies from 18" to 2 feet in thickness, and is well worthy of a fair trial. In its vicinity the lode it cuts or touches will probably be poor in the precious metal, owing to a transference of the gold from the older lode to the newer true vein.

The Tunnel lode has yielded 8 dwts. to the ton, but this was probably from selected quartz, the slate being rejected. A lode yielding 8 dwts. to the ton, and affording 2 feet 10 inches crushing mineral, would be very valuable.

It would be very interesting and probably very satisfactory, when the trolley roads are completed, to try the coarse crushing of

the Tunnel and Hill lodes with one set of batteries. By using blanket strakes and using a coarse mesh, it is not improbable that better results can be obtained with these large mineral lodes than with fine crushing. Two or three tons per day instead of one would be passed through the mill per stamp head. This can be done at some future period.

#### IX.—THE WALLACE LODE.

A tunnel has been driven from the base of the hill a few feet above the level of the mill pond of Barton's mill, to strike the Wallace lode. The length of this tunnel is 170 feet. It strikes the Wallace lode approximately 25 feet below the surface. An adit level is continued on the course of the Wallace lode for a distance of 300 feet. Both tunnel and level are provided with a tramway and a turn-table at the point of junction. These drifts will form an excellent means for draining the surface water from the lodes lying to the north of the Wallace.

The details are shown on the plan of proposed works, No. IV.

The Wallace lode appears to consist of three small lodes, separated by bands of slate and whin; the whole being worked together. The yield was from 5 dwts. to 7 dwts. per ton.

The tunnel on the Wallace lode will be of great value in draining the Forest twin lodes, in case it should be decided to sink on these lodes in this portion of the property, with a view to take out all the mineral between the north and south Forest, inclusive, as mentioned under the head of the Forest lode.

#### X.—THE DUNBRACK LODES.

The Dunbrack lodes have yielded 14 dwts. to the ton. They consist of three small lodes, separated by thin beds of slate and whin. The thickness of the lodes varies from one to three inches. The lode on the hanging wall is the richest. These lodes, in view of more favorable opportunities of obtaining paying mineral, do not appear of sufficient importance to require attention at present. A large and permanent supply of low grade quartz or ore is preferable to small, rich lodes, which can only be mined at great cost, without the presence of slate at the foot or hanging wall provides facilities which are not apparent in the present instance. The Dunbrack, the Chambers, the Wallace, the Iron lodes, and the numerous lodes lying between the Hill lode and the Tunnel lode, and between the Forest lode and the Wallace lode, are stores of mineral in reserve,

which can be examined and used as opportunity offers and the necessities of the mill demand. In the north and south Forest, the Hill lode and the Tunnel lode, there is ample mineral available for many years to come.

#### XI.—THE MILL.

Both as regards construction and machinery, as far as it goes, the Mill is in excellent order. It has at present 10 stampers, with means to introduce at any moment five additional stampers, and room for another five or more when required. The building is very substantially built, and sufficiently roomy to permit the introduction of simple contrivances to save the gold which now escapes in the tailings.

The economy displayed in the management of the mill is very marked, and in striking contrast to some other mills in the province. Quartz, Mr. Forest assures me, can be crushed in this Mill for one dollar a ton, when working day and night. The usual low estimate for a steam mill is \$1.25, but few succeed in reducing the cost to that amount. By water power, mineral can be crushed for 50 cents a ton, when the supply of water is permanent.

But it is not only in the economy of crushing that a quartz mill commends itself; it is rather in the successful use of appliances to save gold after the quartz is crushed, that we can look for and be sure of continued success.

All experience in gold-mining establishes the fact that an abundant supply of low grade ore cheaply mined, crushed, and manipulated is, generally speaking, the only sure and permanent source of profit.

In the present case, all the tailings are allowed to escape directly from the amalgamating plates into the brook which supplies the mill with water.

In the best mills experience shows that not more than from 66 to 70 per cent. of the gold is obtained in the stamp boxes and amalgamating plates, even when the greatest care is taken to add the mercury from time to time, say every hour, to the crushed material.\*

In the Strawberry Hill crusher, it has been the practice to introduce mercury twice a day only; the custom recommended by long experience in Australia and California, is the introduction of

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\*For full particulars respecting the loss of gold in tailings, see Brough Smyth's work on Victoria, J. A. Phillips; on Gold and Silver Mining—Kustel; also Reports on Waverley and Sherbrooke, by the author.

about the same weight of mercury as of gold per ton in the quartz, and to introduce a little at a time, and frequently.

The gold escaping in the tailings, occurs as free gold; gold dissolved in mercury, gold in the pyrites. The quantity of arsenical pyrites in the Forest lode is inconsiderable, but the proportion of sulphurets of iron is large. The quantity of gold mercury dissolves without forming an amalgam (holds in solution), is about four per cent. of its weight. Hence the 70 lbs. of mercury which has been used and consumed since February 1869, in this mill, will contain about  $2\frac{8}{10}$  lbs. of gold, or 31 ounces. Of this quantity a large proportion could be saved in settling-boxes at the extremities of the different sections of the sluices.

The pyrites has for the most part been deposited in the streamlet, and it will be found profitable to sluice the fine stuff in the bed of the stream during the dry season.

Assuming 25 per cent., or one-quarter, as representing the amount of escaped gold, the actual quantity present in the bed of the stream will not fall far short of 500 ounces. In making this estimate, regard is had to the experience everywhere confirmatory of the fact, that in the presence of arsenical and sulphur pyrites, much gold escapes amalgamation.

By very simple contrivances this pyrites can be arrested and saved.

The floured mercury can be in part saved as well as the free gold.

Blanket strakes placed in the sluices and washed every two hours, will save the pyrites, free gold, and some of the floured mercury. The pyrites can be subsequently concentrated in a puddle. Settling-boxes (barrels) at the end of sections of the sluices, will save much mercury, from which the amalgam will crystallize in from four to six months; but these barrels should not be disturbed oftener than once in four months, better once in six months.

The Mill affords ample room for a concave buddle to concentrate the pyrites saved in the blanket strakes; also room for the washing tubs and the storage of a large amount of pyrites. The blankets will require to be washed but once in two hours.

The pyrites, when it has accumulated to a sufficient extent, will have to be roasted in a reverberatory furnace, of the construction described by Kustel or Phillips. Kiln-roasting is wholly inadequate; it merely reduces the sulphides of iron to a lower condition of sulphide, and when arsenical ores are present, it does more harm

than good, by coating the free gold with condensed arsenious acid.

It is important that in making the necessary improvements, room be allowed for the adjustment of a Blake's crusher, and a self-feeding hopper. The trolley road from the main shaft must be constructed so as to dump the mineral into the stone crusher, the stone crusher to shake the crushed stuff into the hopper, the hopper to feed the batteries. There should be no second handling of the ore after it leaves the shaft on its way to the stamp boxes. In some cases a second handling is unavoidable, but much can be prevented. It saves labor, time, and loss by theft.

## XII.—THE DIORITIC DYKE.

The large Dyke shown on the plan adds much to the interest of this property. It can be traced for a distance of three miles, and is well seen near the Bull's Gut, in Pope's Harbour, maintaining a uniform breadth of about 40 feet. But in its passage through the Auriferous Zone, on the Strawberry Hill property, it acquires considerable importance, from the fact that similar dykes in Australia traversing gold-bearing strata are frequently found to be very rich in gold. In Brough Smyth's work on "Victoria," numerous instances are brought forward. In some instances the whole mass of the dyke is auriferous, in others the gold is chiefly concentrated in small flat veins of quartz which traverse the dyke, and are limited to it alone.

(5) Decomposition has affected the Strawberry Hill dyke to some distance below the surface, and especial attention should be paid to the occurrence of small veins in its mass, also to the walls of the dyke where a vein may be found. From the fact that only a very small portion of this dyke has been exposed on the property, and the excavation being in such a condition from falling debris it was quite impossible to make any observations upon it, further than to determine its position, character and relation to the strata it cuts.

It appears to be an intrusive mass, occupying a broad fissure on a course north, seven degrees west. It consequently cuts the Auriferous Zone nearly right angles. For a distance of two hundred feet (the known breadth of the zone) the dyke merits careful examination, and search for small veins, especially near the partially decomposed surface. It may result that the entire mass of the dyke, to the depth of 15 or 20 feet, will be worth crushing. Under all circumstances it is an attractive and promising field, and the only

one of its kind yet known in Nova Scotia, although, as before stated, similar dykes are numerous in Australia, and frequently yield large returns.

### XIII.—THE GOLD STREAK.

From the information obtained, it appears that the gold streak always dips west on the Forest lode, and is cut off by the breaks or faults. The dip of the gold streak is about 75 degrees. The numerous breaks, and the constant recurrence, to a greater or less extent of the gold streak between the breaks, appears to show conclusively that there are on this lode two or more broad gold streaks, or, which is more probable, several narrow ones. It is much to be regretted that a complete record and plan of the works has not been preserved, showing weekly progress and the exact position of the gold streak between the breaks. It would then be an easy matter to determine, with much probability of drawing correct conclusions, how deep it would be necessary to sink in order to strike a gold streak intercepted by a break. The remarkable richness of the Forest lode (north,) the disposition of the gold it holds, and the regularity of the breaks fully warrants the conclusion that deeper mining will cut the continuation of some of the streaks which have proved so rich, although, in the estimate of the yield of the whole of the mineral between the North and South Forest, this has not been taken into consideration. It is, however, a result of so probable a nature that it ought to exercise considerable influence on the prospective value of the ore obtained from these lodes. (See Diagram, No. V.)

One great source of outlay on this property hitherto has arisen from the occurrence of the numerous faults, which, in the absence of systematic records and plans of the works, has led to the sinking of new shafts to search for the lode, in point of fact equivalent to opening a new mine each time a fresh break cut off the lode. It is clear from the plan, that if the method had been pursued of following the break always to the south in drifting from west to east, a large expenditure of money and loss of time would have been avoided. , Commodious working shafts from 200 to 280 feet apart on a lode are generally sufficient for all purposes. Foul air, which, in the ground under review, is sometimes very abundant and oppressive, could be removed by a small fan and air ducts.

A mine must be regarded as a manufactory of gold, and must be conducted, even in its minutest details, with the most jealous regard to economy in all departments. There are many existing gold mines which produce only from 2 dwts. 3 gr. to 2 dwts. 15 gr.

*b* balance of report

per ton, and yet yield very handsome returns; but this result is only attained by crushing large quantities of cheap ore of low grade with the strictest economy. The profit being in fact derived from the tailings, the actual yield of the stampers paying working expenses of the mine only.

There can be no doubt, as far as present appearances warrant the expression of the opinion, that if the Strawberry Hill mine is conducted on these principles, it will not fail to produce very satisfactory returns.

#### XIV.—CONCLUSION.

A careful review of all the facts observed on this property, establishes the opinion that a change in the plan of operations hitherto pursued, (namely, the extraction of rich ore from a small and diminishing lode) to the mining of abundance of mineral of comparatively low grade cannot fail to be permanently remunerative.

The available ore for crushing purposes is practically inexhaustible, and ample for a mill of twice the capacity. The abundance of the lodes is such as to permit of very cheap mining. The yield hitherto obtained warrants the firm expectation that they will prove highly remunerative with economy in their manipulation.

Among the suggestions which might be offered, are the adoption of a weekly record of work done with illustrative plans or diagrams, to serve for both present and future guidance. Frequent analysis of the tailings to ascertain the loss of gold; the adoption at the outset of a plan of operations, and the immediate introduction of those artifices, which all experience in every gold mining country suggests to save gold.

An outline of these different items is subjoined.

HENRY Y. HIND, M. A.

WINDSOR, October 6th, 1870.

## APPENDIX.

### I.—SUGGESTED PLAN OF IMMEDIATE OPERATIONS.

a. Abandon the work on the eastern shafts with exception of No. 3, which make a main shaft, and proceed as stated for (b.)

b. Commence work on main shaft (144 feet deep,) putting whim in order, and constructing trolley road to the mill.

c. Take out the Tunnel lode to the full breadth of 4 feet, leaving 2 feet 10 inches crushing material. This lode and tunnel are in perfect order for immediate operations, and will supply the mill with ore until the lodes on the main Forest shaft are reached.

#### THE MILL.

Use blanket strakes in the mill to collect the pyrites, &c., which should be stored for future operations. Provide washing tubs in the mill.

Continue the sluices for 150 feet from the mill, with barrels at intervals of 50 feet to arrest floured mercury. The barrels should be protected against frost, and are not to be disturbed for 6 months.

Readjust the old buddle to concentrate the pyrites.

Adjust a stone breaker and self-feeding hopper.

Commence system of weekly plotting work done, on a uniform scale, say 10 feet to the inch, in a blank record book.

### II.—SUBSEQUENT OPERATIONS.

a. Sink a main shaft on the Hill lode, east of the Dioritic Dyke.

b. Add 5 stamps to the mill—the power available is enough for 25 stamps.

c. Make provision for the regular analysis of the tailings.

d. Set two men to work to examine the belt of Dioritic trap, in the vicinity of the openings and tunnel. All pieces of quartz taken positively from this dyke should be carefully stored for future examination by themselves.

e. Prepare a plan of the Forest lode from all reliable information, showing position of the richest streaks in the different shafts and stopes, the actual limits of the stopes and where veins occur in the breaks, and also where the spurs towards the South Forest were most numerous.

f. Continue the work suggested on page 11 and shown in Sheet No. IV.

g. Construct a reverberatory furnace.